

AD-A276 762

**1993
Executive Research Project
RS9**

**General Dynamics Land Systems
The Mid-Term Possibilities for
The U.S. Heavy Armor Industry**

**Lieutenant Colonel
Walter B. Grimes, III
U.S. Army**

Faculty Research Advisor
Dr. George R. McAleer, Jr.

**The Industrial College of the Armed Forces
National Defense University
Fort McNair, Washington, D.C. 20319-6000**

Unclassified

SECURITY CLASSIFICATION OF THIS PAGE

REPORT DOCUMENTATION PAGE

1a. REPORT SECURITY CLASSIFICATION Unclassified			1b. RESTRICTIVE MARKINGS		
2a. SECURITY CLASSIFICATION AUTHORITY N/A			3. DISTRIBUTION/AVAILABILITY OF REPORT Distribution Statement A: Approved for public release; distribution is unlimited.		
2b. DECLASSIFICATION/DOWNGRADING SCHEDULE N/A			5. MONITORING ORGANIZATION REPORT NUMBER(S) Same		
4. PERFORMING ORGANIZATION REPORT NUMBER(S) NDU-ICAF-93- R 29			7a. NAME OF MONITORING ORGANIZATION National Defense University		
6a. NAME OF PERFORMING ORGANIZATION Industrial College of the Armed Forces		6b. OFFICE SYMBOL (If applicable) ICAF-FAP	7b. ADDRESS (City, State, and ZIP Code) Fort Lesley J. McNair Washington, D.C. 20319-6000		
8a. NAME OF FUNDING/SPONSORING ORGANIZATION		8b. OFFICE SYMBOL (If applicable)	9. PROCUREMENT INSTRUMENT IDENTIFICATION NUMBER		
8c. ADDRESS (City, State, and ZIP Code)		10. SOURCE OF FUNDING NUMBERS			
		PROGRAM ELEMENT NO.	PROJECT NO.	TASK NO.	WORK UNIT ACCESSION NO.
11. TITLE (Include Security Classification) <i>General Dynamics Land Systems The mid-Term Possibilities for the U.S. Heavy Armor Industry</i>					
12. PERSONAL AUTHOR(S) <i>Walter B. Grimes III</i>					
13a. TYPE OF REPORT Research		13b. TIME COVERED FROM <u>Aug 92</u> TO <u>Apr 93</u>		14. DATE OF REPORT (Year, Month, Day) April 1993	
				15. PAGE COUNT <i>35</i>	
16. SUPPLEMENTARY NOTATION					
17. COSATI CODES			18. SUBJECT TERMS (Continue on reverse if necessary and identify by block number)		
FIELD	GROUP	SUB-GROUP			
19. ABSTRACT (Continue on reverse if necessary and identify by block number)					
SEE ATTACHED					
20. DISTRIBUTION/AVAILABILITY OF ABSTRACT <input checked="" type="checkbox"/> UNCLASSIFIED/UNLIMITED <input checked="" type="checkbox"/> SAME AS RPT. <input type="checkbox"/> DTIC USERS			21. ABSTRACT SECURITY CLASSIFICATION Unclassified		
22a. NAME OF RESPONSIBLE INDIVIDUAL Judy Clark			22b. TELEPHONE (Include Area Code) (202) 475-1889		22c. OFFICE SYMBOL ICAF-FAP

ABSTRACT

TITLE: General Dynamics Land Systems - The Mid-Term Possibilities for the U.S. Heavy Armor Industry

AUTHOR: Walter B. Grimes, III

PURPOSE: To assess the mid-range strategy for survival of one company -- General Dynamics Land Systems Incorporated-- in one segment of the defense industry, heavy armored combat vehicles. The assessment will be conducted from an industry (General Dynamics Land Systems) rather than a defense perspective. Mid-range is defined as the next seven to eight years; from now to the turn of the century.

BRIEF SUMMARY: This paper assesses the ability of General Dynamics Land Systems to survive as a viable, profitable defense contractor for the rest of this century. In order to understand the possible options available to Land Systems, the paper reviews the environment in which the company must operate. Beginning at the macro level, the defense acquisition environment at both the Department of Defense and the Army level is discussed. Also at the macro level, the parent company, General Dynamics Corporation, is described and its current business strategy defined. The industry in which Land Systems competes is addressed, to include its products, its producers, and its users. The specific industry segment of the company is discussed to include, current budget trends, Congressional support, current domestic and foreign demand, and future demand at home and abroad. The paper concludes with a summary of General Dynamics Land Systems' mid-range strategy and an assessment of the likelihood that the strategy will result in the company's survival through the twentieth century.

DISCLAIMER

This research report represents the views of the author and does not necessarily reflect the official opinion of the Industrial College of the Armed Forces, the National Defense University, or the Department of Defense.

This document is the property of the United States Government and is not to be reproduced in whole or in part for distribution outside the federal executive branch without permission of the Director of Research and Publications, Industrial College of the Armed Forces, Fort Lesley J. McNair, Washington, D.C. 20319-6000.

Accession For	
NTIS GRA&I	<input checked="checked" type="checkbox"/>
DTIC TAB	<input type="checkbox"/>
Unannounced	<input type="checkbox"/>
Justification	
By	
Distribution/	
Availability Codes	
Dist	Avail and/or Special
A-1	

INTRODUCTION

The cold war is over! The Soviet Union has collapsed and the Bear is dead! With soaring budget deficits, defense expenditures by the United States government must be quickly and drastically reduced. But wait! The very security of the United States and all that it represents depends on a strong military -- one that is equipped with the most technologically superior weapons possible. It is absolutely essential that we maintain a strong Defense Industrial Base that has the ability to design, develop, manufacture, and support modern weapon systems. The Gulf War proved that we must retain the capability to protect our vital interest by the use of military force. In fact, as our economy becomes more and more globally dependent, the potential for petty tyrants or third world dictators to threaten U.S. national interests grows accordingly.

So goes the debate concerning defense spending and the Defense Industrial Base. The facts are, however, irrefutable. The defense budget is coming down. Additionally, as the size of the military is reduced, the total requirement for equipment is also reduced. The results attained by U.S. military during the Gulf War indicate that our current equipment is superior to anything that might be encountered on today's battlefield. It is becoming more and more difficult to make a case for new systems. Clearly, after forty plus-years of relative prosperity, the United States defense industry is in decline. What portions of the industry and what companies in the industry survive remain to be seen.

PURPOSE

The purpose of this paper is to assess the mid-range strategy for survival of one company -- General Dynamics Land Systems Incorporated-- in one segment of the defense industry, combat vehicles. The assessment will be conducted from an industry

(General Dynamics Land Systems) rather than a defense perspective. Mid-range is defined as the next seven to eight years; from now to the turn of the century.

WHAT TO EXPECT

In order to assess the mid-range strategy for survival of General Dynamics Land Systems Division, you must be familiar with the environment within which the strategy must be implemented. Initial discussion will at the macro level. First, the current defense acquisition environment will be described to include Department of Defense acquisition policy and the Army's interpretation and implementation of that policy.

Staying at the macro level, Land Systems' parent company, General Dynamics Corporation, will be described. Additionally, the current corporate strategy will be discussed.

Beginning to scale down, I will next describe the combat vehicle industry. The discussion will include the industry's products, its producers and its users. Continuing to scale down, I will describe Land Systems and where it fits in the combat vehicle industry.

Next I will discuss the specific segment of the combat vehicle industry in which Land Systems competes, the heavy armored vehicle arena. Current budget trends, Congressional support, current domestic and foreign demand, as well as future demand at home and abroad are covered. I will also look at current efforts and potential areas for Land Systems to expand its business.

Finally, I will summarize General Dynamics Land Systems' mid-range strategy and assess the potential for survival. I believe that the strategy will allow survival through

the end of the decade. However, I believe that the company that survives will not be Land Systems and that survival of the heavy armored vehicle segment of the combat vehicle past the end of the decade is doubtful.

THE DEFENSE ACQUISITION ENVIRONMENT

The strategies that General Dynamics Land Systems implements are going to have to work in the ever changing environment of Defense Acquisition. Policies on the economy, the industrial base, and national security, among others, will all impact on the success or failure of General Dynamics Land Systems. It is worthwhile, then, to explore the current Rules of Engagement.

The Department of Defense Approach

The Department of Defense [DOD] announced that it was revising its approach to systems acquisition on 29 January 1992 during a DOD Budget Briefing by Secretary of Defense Dick Cheney, Deputy Secretary of Defense Donald Atwood, and Chairman of the Joint Chiefs of Staff, General Colin Powell.¹ The new DOD acquisition strategy places greater emphasis on developing technology, envisions fewer traditional developments and production programs, and relies more heavily on system upgrades and technology insertions.

On 20 May 1992, the Under Secretary of Defense, Don Yockey, released four white papers which provide details on the new acquisition policy. The white papers cover Defense Acquisition, the Defense Industrial Base, Defense Science and Technology Strategy, and Science and Technology Management and Oversight. The four papers are summarized below:

Defense Acquisition. This capstone white paper, summarizing the revised DOD acquisition policy, recognizes that the reduced threat of all out conventional war in Europe dictates a reduction in the size of the armed forces. Further, since potential adversaries will not be introducing new technologies into their armed forces, the urgency for the United States to continuously modernize its weapon systems is significantly reduced. Weapon systems will be retained longer and new systems will be developed more methodically. There is a recognition that there will be excess industrial capacity as a result of fewer weapons purchases. Provisions will be made to identify and sustain critical manufacturing processes.

The requirement to maintain technological superiority will result in increased research and development expenditures, but not more procurement. Technologies will be demonstrated, tested, and proven to be producible through the use of Advanced Technology Demonstrations (ATD). Many successfully demonstrated technologies will not result in new weapons or system upgrades. New weapons or upgrades will only be acquired when the ATD has been successful, there is a verified need, and the system or upgrade is cost effective.

The Defense Industrial Base. This white paper establishes DOD's objectives and approach for the downsizing of the Defense Industrial Base. There are four objectives that the evolving Industrial Base must be able to meet. These include the following:

- . Capable of supporting the base force
- . Capable of supporting planned contingencies
- . Capable of responding to emerging threats
- . Capable of remaining as efficient and cost effective as possible

There are four steps in the DOD approach to meeting these objectives. The steps are as follows:

- . Procure the necessary systems to maintain technological superiority. The primary approach to downsizing will be to let the free market prevail.
- . Continue to develop innovative manufacturing technologies. The need for more flexible manufacturing processes is specifically mentioned.
- . Establish an oversight process to identify and preserve critical processes, products, and capabilities.
- . Stimulate changes in the industrial base that will increase efficiency and competition. Competition between contractors and the depots for maintenance work is specifically identified as is shifting from military - unique to commercial products and processes.

NOTE: Tank production is used as an example of a capability which is not critical. The only actions required are research and development of armor and prudent shutdown planning and execution. DOD concluded that there is enough time to reconstitute the tank industrial base if a threat emerges.

Defense Science and Technology Strategy There are three key elements to the Science and Technology (S&T) Strategy. They are as follows:

- . Sustain and apply the advances in information technology
- . Involve the User early and continuously.
- . Demonstrate the technology extensively and realistically using Advanced Technology Demonstrations.

Seven broad areas are identified to provide focus for the S & T program. They are Global Surveillance and Communications, Precision Strike, Air Superiority and Defense, Sea Control and Undersea Superiority, Advanced Land Combat, Synthetic Environments, and Technology for Affordability. Discussion of Advanced Land Combat indicates the thrust will be on the deployability (weight), mobility, firepower, and survivability of land combat systems.

Science and Technology Management and Oversight. This paper describes the decision making and management processes for the Science and Technology Program.

The Army Acquisition Executive Approach

Stephen K. Conver, the former Army Acquisition Executive, outlined his approach to the new DOD acquisition strategy in a speech entitled "Shaping the Industrial Base of the Future" given on 23 July 1992 at the Army Modernization Roundtable. He is concerned about how the downsizing of the industrial base will be managed by DOD. Mr. Conver advocates continuous modernization through the use of system upgrades. Upgrades provide warfighting and industrial benefits. Other potential methods for managing the downsizing include production stretch out, support for FMS, support for industry consolidation, and best-value source selection (not necessarily lowest cost).² He believes that some or all of the public sector --depot, arsenals, and plants-- workload can be allocated to the private sector. Finally, the reduced modernization budgets may not be capable of supporting both full service vendors and build-to-print vendors. Mr. Conver is an advocate of protecting the technical development, system design, system development, and sustainment capabilities of the full-service vendors.³

GENERAL DYNAMICS CORPORATION -- THE PARENT

General Dynamics Corporation is headquartered in Falls Church, Virginia. It develops, manufactures, and engineers military aircraft, missiles, gun systems, space systems, tanks, submarines, electronics, commercial space launch vehicles, and general aviation craft; produces and distributes lime, limestone, sand, gravel, ready-mix concrete, pipe, and other related building materials; and mines coal.⁴ The corporation has 75,300 employees. In 1991, revenue was 8.8 billion dollars and net income was 505 million dollars.⁵ General Dynamics has established four core areas of the business:

Tactical Aircraft

Nuclear Submarines

Armored Vehicles

Space and Launch Systems⁶

These four core businesses accounted for 6.2 billion dollars (over 70 %) of 1991 revenue and 289 million dollars (over 54 %) of 1991 net income.⁷

General Dynamics' Corporate Strategy

General Dynamics Corporation has established a corporate strategy that recognizes the realities of today's defense acquisition environment. The overall corporate strategy is based on a conviction that the United State's defense industry go through a process of rationalization.⁸

The first element of rationalization is based on a recognition that the industry must downsize. The demand for procurement of weapon systems is significantly less than it was in the eighties. What's more, the demand is likely to continue to decline.

Therefore, it is imperative that the supply of plant, equipment, and personnel contract accordingly.

The second element of nationalization is consolidation. There is insufficient demand to accommodate all of the firms currently in the Defense Industrial Base. Consolidation means reducing the number of firms in the defense industry. General Dynamics flatly rejects two alternatives often advanced as the solution for the defense industrial base's excess capacity. Neither diversification, defense companies buying or creating non-defense businesses, nor conversion, defense companies transforming their defense production lines into commercial production lines, are part of the General Dynamics strategy.⁹

General Dynamics will concentrate on operations where they are number one in the market or possibly number two with a strong probability of becoming number one. To this end, General Dynamics initially stated that it would concentrate on its four core businesses: tactical aircraft, nuclear submarines, armored vehicles, and space-launch systems. All other operations would be sold off.

Recently, however, company officials have indicated that even sale of the core businesses will be considered. In fact, the sale of the tactical aircraft division to Lockheed was announced in December of 1992.¹⁰ The clear aim of the General Dynamics strategy is to increase shareholder value and stay ahead of the impending dramatic decline of the demand for defense industry products. As of 2 November 1992, the price of a share of General Dynamics stock was \$103. This is compared to a price of \$20.25 per share during January, 1981.¹¹

THE COMBAT VEHICLE INDUSTRY

Some definitions of the combat vehicle industry include tactical trucks. This discussion of the combat vehicle industry will be limited to tracked vehicles. An exception is the Light Armored Vehicle (LAV), manufactured by Diesel Division, General

Motors of Canada (DDGM). Production of the Marine Corps' basic requirement for 759 LAV's is complete. DDGM has obtained additional Foreign Military Sales (FMS) orders from the Kingdom of Saudi Arabia and Australia. These orders, along with small quantities of two additional Marine Corps variants, will keep the LAV in production through the mid 1990's.¹² Since DDGM is a Canadian firm and is not likely to compete for future combat vehicle business, they will not be included in the remainder of this discussion.

An Oligopoly?

The tracked Combat Vehicle Industry might be classified as an oligopoly-- an industry with only a few producers. Each producer is the sole source provider of a particular weapon system. There are only three Original Equipment Manufacturers currently producing combat vehicles in the United States. These companies and the systems that they produce are show below:

General Dynamics Land Systems
(GDLS)

FMC

BMV

Abrams Main Battle Tank

Bradley Infantry/Calvary

Fighting Vehicle

Multiple Launch Rocket System
(MLRS)

M113 Family of Vehicles

Armored Gun System
(in development)

M88A1 Recovery Vehicle

M9 ACE (Armored Combat Earth-

mover)
Future Armored Resupply Vehicle -
Ammunition
M109 Series Howitzers
(to include Paladin)¹³

Only General Dynamics Land Systems and FMC are full service vendors. Full service vendors have the capability, as the name implies, to provide cradle to grave acquisition life cycle support for a weapon system. Each firm can fully design, develop, test manufacture, and support a combat vehicle weapon system. FMC owns and operates its manufacturing facility. GDLS, on the other hand, manufactures tanks in a government owned, contractor operated (GOCO) facility.¹⁴

BMV is a build-to-print manufacturer. It enters the manufacturing process only after an engineering firm or full service vendor has developed the Technical Data Package. BMV is characterized by its flexible, contractor owned, contractor operated (COCO) manufacturing facility.¹⁵ The cost-efficient manufacturing facility is easily modified and able to produce low-rate quantities profitably. This makes BMV particularly competitive on Product Improvement Programs (PIPS). Only BMV currently has both steel and aluminum armor combat vehicle capability.¹⁶

Or a Monopoly?

On December 2, 1992, FMC Corporation and Harsco Corporation announced that they signed a letter of understanding to combine FMC's Defense Systems Group and Harsco's BMV Combat Systems division. FMC will control 60 per cent interest and HARSCO, 40 per cent in the joint venture.¹⁷ Finalization of this merger will mean that one firm controls the light and medium tracked combat vehicle market. With the exception of

BMV's M88A1 contract, GDLS controls the heavy tracked combat vehicle market which consists solely of the Abrams main battle tank. Foreign competition will be addressed later. It should be noted that there are no commercial counterparts to maintain the manufacturing base established by these three - soon to be two - companies.

A Monopsony

The United States government is the only buyer for tracked combat vehicles. Many of the weapon systems are either being sold or marketed to foreign countries. However, these are Foreign Military Sales and administered by the United States government.

The Vendor Base

Just a word about the supporting vendor base: for the most part, their market is an oligopoly. As with the original equipment manufacturers, the supplier base is dependent upon the continued production of tracked combat vehicles. Only two of twenty critical combat vehicle subsectors have commercial compatibility for their critical manufacturing skills.¹⁸ It is doubtful that orders for repair parts can sustain these firms in the absence of continued system production.

GENERAL DYNAMICS LAND SYSTEMS, INCORPORATED.

General Dynamics Land Systems, Inc. is headquartered in Sterling Heights, Michigan. It develops, engineers, manufactures, and supports the Abrams Main Battle Tank. The corporation has over 4000 employees. In 1991, revenue was 1.12 billion dollars and operating income was 101 million dollars.¹⁹ Land Systems has three major profit centers:

Manufacturing

Engineering

Services Company (post production/logistical support)

Manufacturing accounted for approximately 50 per cent of 1991 revenues and 70 per cent of 1991 operating income. The other two profit centers contributed equally to 1991 revenue with Services Company accounting for most of the remaining operating income.²⁰

General Dynamics corporation purchased Chrysler's Defense Division in February 1982, and General Dynamics Land Systems Incorporated was established. Since then, Land Systems has manufactured almost 8,000 Abrams Main Battle Tanks for the U.S. Army and Marine Corps. Tanks are fabricated and assembled at the government owned Lima [Ohio] Army Tank Plant. Some component machining occurs at the government owned Detroit Arsenal Tank Plant. Other manufacturing is accomplished at company owned manufacturing plants in Scranton, Pennsylvania and Sterling Heights, Michigan.

Land Systems -- The Current Situation

General Dynamics Land Systems, Inc. is one of the parent Corporation's core businesses. Although the core business is called armored vehicles, the business is actually more narrowly defined than that. Land Systems manufactures only heavy armored vehicles; essentially main battle tanks. Attempts to expand its position in the combat vehicles industry have been largely unsuccessful. FMC has been the leader in the medium and light armored vehicle industry. That position was strengthened with the recent merger between FMC and BMY. Thus, General Dynamics Land systems, Inc. is in the business of building tanks.

THE HEAVY ARMORED VEHICLE ENVIRONMENT

United States Budget Trends

Budget trends during the last several years have been bleak. General Dynamics Land Systems Inc. is a defense contractor whose sales are almost exclusively to the United

States Army. The Marine Corps did purchase M1A1 Tanks. However, that procurement is completed and no future sales are forecast at this time. A closer look at the Procurement portion of the budgets reveals the double whammy faced by Land Systems. The corporation is dealing with the service getting the greatest percentage reductions and dealing in one of the two Army procurement lines that are receiving the greatest percentage reductions. DOD outlays as a per cent of federal outlays reached a thirteen year high of 27.3 % in 1987. Since then, the percentage has dropped steadily and stands at only 18 % in the fiscal year 1993 budget submission.²¹ Using constant FY 92 dollars as the measure, and comparing FY 86 budgets of each service to the 1993 budget submission, the Army has the largest percentage reduction.²² Using current dollars as a measure and comparing the FY 90 budget to they FY 93 budget submission, the following facts are revealed:

DOD Procurement - 39.3% reduction

Army Procurement - 48.3% reduction²³

Specifically, tank purchases are made from the Wheeled and Tracked Combat Vehicle appropriation. Looking at that appropriation in current dollars from FY 90 to the FY 93 budget submission reveals a drop-off of - 74.9% (Note: A Congressional plus-up reduced the decrement to -62.9%). Only one Army procurement line had a greater decline.²⁴

Congressional Support

The Congress of the United States has been unwavering in its support for the tank industrial base and the continuation of production or upgrade of main battle tanks. Congress has shown that it is willing to slow down or stretch out orders for new systems, but not cancel them.²⁵ The Senate Appropriations Committee Report on the 1991 Defense Appropriation Bill states,

The Committee finds it cannot support the Department of Defense's decision to terminate the M1 Abrams program after fiscal year 1991. While there is merit to the Army's analysis ... this decision must also be weighted against the need to maintain a \$ 2,000,000,000 tank production industrial base that will go cold before the next generation Block III tank is fielded ... the Committee will support the plan to continue the M1 tank line in the future with a combination of foreign military sales and an upgrade program of older 105 mm tanks to the 120 mm M1A1 configuration.

In the 1992 Senate Appropriation Committee Report on the FY 92 Defense Appropriation Bill, another strong statement appears,

The Army requested no funding within the amended fiscal year 1992 budget request for the Congressionally directed M1 series tank upgrade program ... the Committee is disappointed that it must reiterate its direction to the Department of Defense to expeditiously ... to commence an M1 series tank upgrade program ... Congress could not be more clear and expects the Department to comply.

Other language specifically forbade using any authorized funds for closure of any portion of the tank industrial base.²⁶ The report on the Authorization Act for FY 1993 by the House Armed Services Committee contains strong, specific language to keep the tank industrial base intact. Equally strong support is seen on the part of the House Appropriations Committee, and the Senate Armed Services Committee in fiscal year 1993 reports. Both Houses have continuously supported and continue to direct that the tank industrial base be maintained.

The Demand For Main Battle Tanks -- United States Army

The current United States Army production contract calls for production through April, 1993. This contract will complete the procurement of the M1A1 Abrams Main Battle Tank and deliver sixty-two M1A2 Main Battle Tanks. These will be the only newly

manufactured M1A2's procured by the United States Army. (A primer on the differences between the various models of the Abrams is at Appendix A.)

General Dynamics received good news recently when the Army and the Department of Defense agreed to implement an M1 upgrade program, modifying the older M1's to the M1A2 configuration. This upgrade program "teams" Land systems with Anniston Army Depot in Alabama. Anniston will remove and dispose of the turret and recycle usable components. The stripped hull will then be shipped to the Lima [Ohio] Army Tank Plant where Land Systems will build a new turret, update the old hull, and complete the assembly process. Although the Army's plan is not finalized, it is believed that the Army will initially procure 210 upgraded M1A2's. Deliveries begin in late 1994 and last through fiscal year 1996.²⁷ This will equip one division and provide assets for use in training armored crewmen and maintenance personnel.²⁸

The Demand For Main Battle Tanks -- Foreign Military Sales

General Dynamics Land Systems is absolutely dependent on the sale of main battle tanks to foreign customers for its very existence. Currently, the government of Egypt is receiving M1A1 Abrams tanks in kit form in a unique co-production agreement. Egypt initially purchased 25 complete M1A1's to utilize for troop and factory training. The additional 530 vehicles are being co-produced. Land Systems manufactures the hull and turret which are shipped to Egypt along with an assembled production kit. The Egyptian work force will do more and more assembly and component manufacturing over the length of the contract.²⁹ Although production schedules are subject to change, this procurement is currently scheduled to be completed in 1995.

Land Systems also has a contract to produce 315 M1A2's for the Kingdom of Saudi Arabia. The United States government has agreed to sell 465 M1A2's Abrams Tanks to

the Saudis, but the second increment of 150 M1A2's is not yet on contract.³⁰ The second increment has been delayed because of a Saudi Arabian cash shortage, but is expected to be resolved with no impact on production.

The third foreign military sale that seems solid at this point is with Kuwait. After a side-by-side trial against the British Challenger II in August of 1992, the Kuwaitis announced that they would buy 236 M1A2 Abrams Tanks. The Abrams' performance was significantly superior to the Challenger II's during the trials.³¹

Future Demand For Main Battle Tanks -- United States Army

The Army's current plans call for the entire CONUS contingency corps to be equipped with the M1A2 Abrams Tank by the end of the decade.³² Phase II of the upgrade program calls for 792 of the older M1 Tanks to be upgraded to the M1A2 configuration. Budget decisions for Phase II have not been finalized and the Milestone III Defense Acquisition Board for decision Phase II is not scheduled until mid 1994.³³

The army has essentially ended its Armored System Modernization Program (ASM) which included the Block III Tank. Citing the reduced threat, declining budget, and the reduced size of the military, the Army postponed indefinitely its program to build six new Armored Vehicles. Land Systems was teamed with FMC in a joint venture on this program. The government contract with Armored Vehicles Technologies Associated, the Land Systems/ FMC joint team, will be phased out by March of 1993. It is reported that some work will be continued by the other ASM contractor, Teledyne Continental Motors. It is interesting to note that Teledyne is not a full service vendor, but rather an engineering house (in contrast to Mr. Conner's support for full-service vendors).³⁴

It is possible the Army could decide to upgrade more of the older M1 and M1A1 Abrams Tanks and/or develop an M1A3 to incorporate future improvements. However, neither of these alternatives is currently under consideration.

Future Demand For Main Battle Tanks -- Foreign Military Sales

There may be a demand for as many as 2700 main battle tanks over the next decade by a variety of countries.³⁵ Competition for these sales will be heightened because all of the competitors are facing declining sales in their own countries. Major competition for these foreign sales will be among the following:³⁶

General Dynamics Land Systems	USA	M1A2
Vickers Defence	United Kingdom	Challenger II
Giat Industries	France	Leclerc
Krause Maffei	Germany	Leopard II
N/A	Russia	T-80

Other modern main battle tanks that, although not currently exported, could offer future competition are the Merkava from Israel, the Mitsubishi Type 90 from Japan, and the Hyundai Type 88 from the Republic of Korea. Former Warsaw Pact countries could also enter the market.³⁷

Of interest during the mid-range period are potential sales to the Kingdom of Saudi Arabia, the United Arab Emirates, Kuwait, and Sweden. In addition to 465 already approved, it is believed that the Saudis plan to purchase an additional 235 tanks.³⁸ There are even some reports that the Saudi requirement may be as high as 1800 tanks.³⁹

The United Arab Emirates (UAE) has announced that it will purchase up to 390 main battle tanks, during the second half of the decade from Giat Industries in France.⁴⁰ UAE had been close to formalizing an agreement to purchase 337 M1A1 Abrams Tanks but stopped short for fear of a potential U.S. Congressional investigation into its involvement in the Bank of Commerce and Credit International Scandal.⁴¹

In addition to the 236 M1A2 tanks that they have already ordered, there are indications that the Kuwaitis may have a total requirement of 760 heavy tanks; a potential increase of 524.⁴²

Sweden will procure 200 new tanks by the end of the decade. Competitive trials will continue through June of 1993 with the M1A2, the French Leclerc, and the German Leopard 2 all in the running.⁴³

The competition for the Kuwait sale was indicative of the fierceness of these competitions. A story circulated that Vickers would pay \$10,000 for any picture taken during the Gulf War of an Abrams stuck in the sand. Almost anything goes in the competition for tank sales which could mean the earning of tremendous profits, and in many cases, the survival of corporations.⁴⁴

LAND SYSTEMS -- ADDITIONAL CURRENT AND POTENTIAL BUSINESS

During the next eight years, no other system will replace the main battle tank as the bedrock for General Dynamics Land Systems, Inc. However, additional possibilities may help to keep production levels up at the Lima Army Tank Plant. Despite the Army's decision to pursue fielding 200 of BMV's upgraded M88 A1's rather than Land Systems' Abrams Recovery Vehicle, there was some good news.⁴⁵ The Army will use an M1A1

Abrams tank chassis to carry the new obstacle-breaching vehicle and the new Heavy Assault Bridge. Each of these two programs is for 106 vehicles.⁴⁶ That decision will provide Land Systems with a significant advantage in the competition for these derivative business contracts.

Land Systems is also competing for the follow-on contract for 660 upgraded M109 Paladins.⁴⁷ BMY is currently under contract to build the initial 164 Paladins and is also competing for the follow-on contract. FMC is also a competitor (Since the FMC/BMY merger has not been formally consummated, both firms will submit proposals). BMY is the favorite in this competition. Land Systems will also compete for the Army's Advanced Field Artillery System (AFAS), and possibly the Future Armored Resupply Vehicle-Ammunition (FARV-A) programs.⁴⁸ Either of these programs would be a big boost to the Engineering section of Land Systems. As the development of the M1A2 comes to a close, Land Systems will be hard pressed to keep the engineering staff gainfully employed and thus stands to lose much expertise.

Since the M1A2 is in production and the upgrade program is approved, the Systems Technical Support (STS) contract will help to keep engineers on the rolls. Additionally, each of the FMS contracts requires varying numbers of modifications from the basic M1A2 design.

Land Systems is actively seeking additional research and development work. In July, GDLS and FMC won competing contracts to study the use of composite materials in the construction of lightweight combat vehicles.⁴⁹ Also, a small contract was awarded to Land Systems by the Navy for the first phase of a three-phase, seven year program. Phase I is for study and design concepts to address launch methods for two Advanced Technology Demonstrations (ATD). The goal of the ATD's will be to develop technology

for an Advanced gun weapon system that will perform with a downsized fleet in the 21st century.⁵⁰ The best prospect for keeping the engineering staff intact may be the InterVehicular Information System (IVIS) designed for the M1A2. This digital command and control system could be adopted as the standard tactical command and control system throughout the Army's combat vehicle fleet.⁵¹

Finally, the FMS sales will be a boon for the General Dynamics Services Corporation. It is anticipated that Contractor Logistics Support contracts will go to Services Corporation from all sales. Additionally, in-country depot work offers significant potential.⁵² The fielding of the M1A2 in the United States Army will also provide a significant workload for Services Corporation. As the fielded fleet continues to age, the requirement for the logistic capabilities of Services Corporation will increase.

SUMMARY OF GENERAL DYNAMICS LAND SYSTEMS INC. MID-RANGE STRATEGY

Manufacturing remains the key to profitability. During the next eight years, General Dynamics will:

- . Improve efficiency to reduce cost on the M1A2 production line.
- . Lobby to obtain more of the upgrade business by working to convince Congress and DOD to privatize the depots to save the industrial base.
- . Obtain additional FMS sales. Solicit maximum government support by stressing the positive impact on the industrial base.
- . Lobby extensively to get Phase II of the U.S. program approved and funded.

In Engineering, the thrust will be to circle the wagons and minimize losses by:

- Designing Modifications for FMS sales.
- Providing System Technical Support.
- Aggressively searching for new business, in areas other than tanks.
- Marketing the benefits of the Inter-Vehicular Information System.
- Lobbying for the vital nature of full service vendors as opposed to either build-to-print or engineering houses.
- Influencing the government to award contracts to full service vendors based on overall capability.

General Dynamics Services corporation will leverage the vast potential of logistical support for the FMS markets while maintaining the base U.S. logistics and support operations.

ANALYSIS OF LAND SYSTEMS MID-RANGE STRATEGY

First, I believe that General Dynamics Land Systems, Inc., will survive until the year 2000. It may very well change names, but the business of designing, developing, producing, and supporting heavy combat vehicles will survive.

It must be recognized that GDLS has very little flexibility to pursue any strategy other than producing tanks. Like it or not, GDLS is in the heavy combat vehicle business. That's where their expertise is. FMC is the leader in the medium and light combat vehicle market.⁵³ Their position will be strengthened by the merger with BMY. That

merger makes any attempt by GDLS to break into the medium or light markets very unlikely to be successful.

The sound production base provided by Phase I of the U.S. upgrade program and the FMS cases already on the books provide a solid foundation for the future. The advantage of already having two main battle tank customers in the Middle East is significant. Also, outclassing the Challenger II in Kuwait provided a marketing coup. GDLS is on sound footing to compete successfully for additional FMS sales. One unknown is the potential impact of arms control initiatives. A world-wide agreement not to sell arms in the Middle East would be devastating. However, I think such an agreement is unlikely in the next eight years.

What about the likelihood for a Phase II U.S. program? I think the signs are favorable here, too. There is no sign that the aforementioned Congressional support has changed. Additionally, the Army is now supporting the program. The big question is funding. Early indications are that the Clinton presidency may be better for the U.S. defense industry than the Bush presidency would have been. President Clinton's commitment to lower unemployment and to aid the economy will argue against eliminating programs already in production.⁵⁴ In fact, President Clinton has come out in favor of keeping most of the major weapon systems in development and production.⁵⁵

I also believe that GDLS will be successful in increasing profitability by increasing efficiency on M1A2 upgrades and production. The learning curve is significant in tank production. Over the last twelve years, labor has been reduced from 20,000 hours per tank to 5,000 hours per tank on current M1A1 production.⁵⁶ I am, however, less optimistic about the ability to gain additional business by privatizing the depots. Even

though the former Army Acquisition Executive came out in favor of some privatization, there is strong opposition in other parts of the Army. Additionally, the depots enjoy strong Congressional support- to the extent of having legislation limiting the amount of work that can be contracted out to private firms.⁵⁷ I don't see privatization as being part of GDLS's salvation.

Phase II of the M1A2 upgrade program and some additional FMS will insure tank production through the decade. But what about Engineering and R&D? The simple fact is that as the M1A2 becomes more mature, the requirement for engineers will decline. Attempts to seek new business will be stymied by President Clinton's intention to divert defense R&D funds to civilian R&D activities. Also, the argument for full service vendors is aimed at government depots and labs, build-to-print corporations, and engineering houses. The political strength of the depots and labs will protect their interests in this argument. Much of what GDLS stood to gain from the full service vendor argument was lost when FMC and BMY merged. As with privatization, the full service vendor argument will not do much for GDLS in either R&D or production.

The potential to market the IVIS's system across the Army's combat vehicle fleet is real. However, the potential is not sufficient to prevent a significant reduction in GDLS's engineering.

Services Corporation should remain solid. The current and potential FMS business plus on-going U.S. efforts will make Services Corporation a growing business during the rest of the decade.

CONCLUSION

Peter F. Drucker believes that the first step in strategic planning is to ask the following question: If we were not committed to this today, would we go into it? If the answer is no, the question becomes how can we get out fast?⁵⁸ I believe that General Dynamics Corporation has made the decision to "get out fast" and will sell Land Systems.

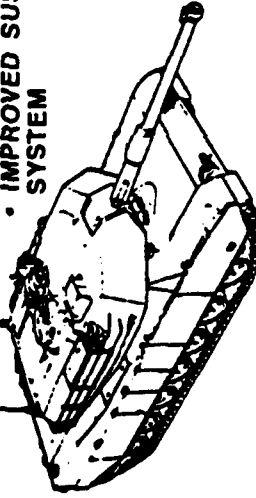
However, the heavy combat vehicle industry will survive through the decade. The combination of U S upgrades and foreign production will be sufficient to support the industry until the turn of the century. Just as the transition from Chrysler to General Dynamics was mostly a name change in 1982, the "new" heavy combat vehicle manufacturer will look very much the same as Land Systems. The company will get smaller, but survive.

I'm not so optimistic about the 21st century. The foreign market is limited. Additionally, since the useful life of a tank is typically assumed to be 30 years, the United States will not need to produce new tanks for at least 15 years.⁵⁹ This point is particularly true in today's environment where it is unlikely that a new, superior threat will be developed. The emphasis on less forward basing and greater strategic mobility for our future military argues against the heavy main battle tank.⁶⁰ Combat vehicles of the future will likely be smaller; that will give the edge to FMC and its light and medium production capabilities. The move toward smaller combat vehicles and the potential for lighter composite armor will eliminate the market for heavy combat vehicles by the early part of the next decade.

ABRAMS TANK EVOLUTION

BASIC M1 1980-1985

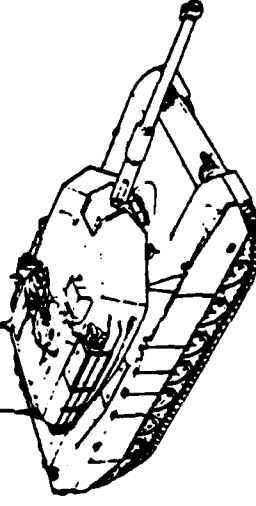
- 105mm GUN
- SPECIAL ARMOR
- COMPARTMENTED AMMO, FUEL STORAGE
- AGT-1500 TURBINE ENGINE
- X1100 TRANSMISSION
- IMPROVED SUSP. SYSTEM



60 TONS

IMPROVED PERFORMANCE M1 1984-1986

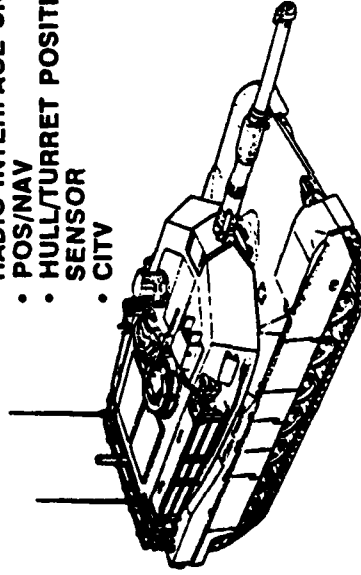
- EXTENDED TURRET
- INCREASED CAPACITY SHOCK ABSORBERS
- ADDED ARMOR PROTECTION



61 TONS

M1A2 1992-

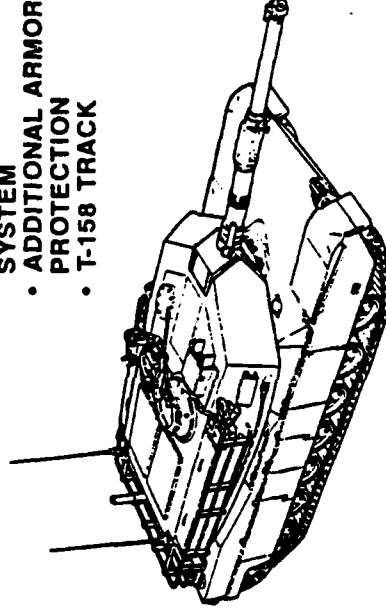
- ICWS
- DU ARMOR
- DUAL AXIS HEAD ASSY
- CORE DIGITAL ARCH.
- RADIO INTERFACE UNIT
- POS/NAV
- HULL/TURRET POSITION SENSOR
- CITV



68.5 TONS

M1A1 1985-1993

- 120mm GUN
- NBC OVERPRESSURE SYSTEM
- ADDITIONAL ARMOR PROTECTION
- T-158 TRACK



67 TONS

ENDNOTES

1. Charles B Cochran, "DOD's New Acquisition Approach," Program Manager, July-August, 1992, p. 38.
2. David Silverberg, "Conver Urges Army to Privatize Some Depots," Defense News, April 13 -19, 1992, p. 15.
3. Acquisition Chiefs See End of Breakout to Help Industrial Base," Aerospace Daily, April 8, 1992, p. 41.
4. 1992 Disclosure Report for General Dynamics Corporation provided by Disclosure On-Line Database.
5. Richard A. Oppel, Jr. and Jennifer Files, "General Dynamics Reportedly Considering Sale of Fort Worth Unit," Dallas Morning News, October,25 1992, p. 1.
6. "General Dynamics to Concentrate on Four Businesses," UPI Press Release, May 6, 1992.
7. 1992 Disclosure Report for General Dynamics Corporation provided by Disclosure On-Line Database.
8. William A. Anders, "Rationalizing American Defense Industries," the Keynote Address to the Defense Week 12th Annual Conference, October 30, 1991.
9. William A. Anders, "Revisiting The Rationalization of America's Defense Industrial Base," Remarks to the Aerospace Industries Association Human Resources Council, October 27, 1992.
10. Steven Pearlstein, "Wall Street Hails Defense Consolidation," The Washington Post, December 10, 1992, p. B 11.
11. Jeff Cole, "Swords Into Shares, General Dynamics Contemplates Selling Its Remaining Units," The Wall Street Journal, November 3, 1992, p. 1.
12. Anders B. Aadland, Baseline Assessment of the Combat Vehicle Industry, 1992 Executive Research Project, The Industrial College of the Armed Forces, p. 8.
13. Production and Rebuild Industrial Base Analysis Briefing, United States Army Tank Automotive Command, April 6, 1992.
14. Lima Army Tank Plant Fact Sheet (undated).

15. Barnaby J. Feder, "2 Military Vendors in Joint Effort." The New York Times, December 3, 1992, p. D-2.
16. Production and Rebuild Industrial Base Analysis Briefing, United States Army Tank Automotive Command, April 6, 1992.
17. "FMC and Harsco to Combine Defense Business," FMC News Release, December 2, 1992.
18. Production and Rebuild Industrial Base Analysis Briefing, United States Army Tank Automotive Command, April 6, 1992.
19. 1992 Disclosure Report for General Dynamics Corporation provided by Disclosure On-Line Database.
20. Interview with William F. Cody, Corporate Director, General Dynamics Land Systems, November 18, 1992.
21. Dick Cheney, Secretary of Defense, Annual Report to the President and the Congress, February, 1992, p. 133.
22. Ibid. p. 132.
23. Ibid. p. 131.
24. Office of the Secretary of the Army (Research, Development, and Acquisition) Briefing, January 31, 1992.
25. Henry J. Aaron (Editor), Setting National Priorities - Policy for the Nineties, The Brookings Institution, Washington, D. C., 1990, p. 10.
26. Section 111 (a) of the Conference Report to Accompany HR 2100, the National Defense Authorization Act for Fiscal Years 1992 and 1993, November 13, 1991.
27. Neil Munro, "U S Army Plans Broad Modernization of Armored Units," The Defense News, October 5, 1992, p. 30.
28. "Interview with Michael P. W. Stone, Secretary of the Army," Armed Forces International, October, 1992.
29. "Abrams Trials Advance Aid Export Prospects," International Defense Review, May, 1992, p. 462.
30. "Saudis OK M1A2 Tank Buy," Defense News, July 20, 1992, p. 2.

31. John J. Roos, "Kuwaiti Results: M1A2 Betters Challenger; Warrior Betters Bradley," Armed Forces Journal, November, 1992, p. 25.
32. Barbara Starr, "U S Army Seeks Full M1A1 Upgrade," Janes Defence Weekly, August 15, 1992, p. 11.
33. Program Manager, Abrams Tank System Upgrade Program Briefing, November 12, 1992.
34. Susanne M. Schaffer, "Army Ends Most Expensive Weapon Program," The Associated Press, October 8, 1992.
35. Neil Munro, "Armies Take Opposite Roles in Modernization," Defense News, January 29, 1992, p. 6.
36. "Main Battle Tanks; Competition on a Global Scale," Defense And Armament Journal, June, 1992, pp. 22 - 23.
37. Ibid. p. 24.
38. Barbara Starr, "Saudis Confirm M1A2 Tank Buy," Janes Defence Weekly, July 25, 1992.
39. Neil Munro, "Armies Take Opposite Roles in Modernization," Defense News, January 29, 1992, p. 6.
40. "UAE Orders 390 French Tanks in Deal Valued at \$3.5 Billion," The Washington Post, February 15, 1992, p. A 13.
41. David Silverberg, "Saudis, Emirates Rethink Tank Buys," Defense News, April 23, 1992, p. 3.
42. Neil Munro, "Kuwaitis to Triple Tank Purchase to 760," Defense News, September 28, 1992, p. 18.
43. "German Army Ships Leopard," Defense News, October 26 - November 1, 1992, p. 2.
44. John Roberts, "Middle East: Western Powers Bid for Share of the Arms Market," Inter-Press Service, October 13, 1992.
45. Caleb Baker, "Army Rejects G D 's Recovery Vehicle Proposal," Defense News, January 13, 1992, p. 12.
46. Neil Munro, "U S Army Plans Broad Modernization of Armored Units," The Defense News, October 5, 1992, p. 30.

47. Vargo Muradian, "U S Army to Divert \$322 Million Into Artillery Program," Defense News, October 19 - 25, 1992, p. 18.
48. Glenn W Goodman, Jr, "George P. Psihas, From the Boardroom," Armed Forces Journal, February, 1993, p. 41.
49. "General Dynamics, FMC Win Study Contracts," Defense News, July 13, 1992, p. 16.
50. "General Dynamics Awarded Advanced Gun System Technology Contract," Press Release Newswire, October 12, 1992.
51. Glenn W Goodman, Jr, "George P. Psihas, From the Boardroom," Armed Forces Journal, February, 1993, p. 41.
52. Aerospace Daily, October 16, 1992, p. 88.
53. Production and Rebuild Industrial Base Analysis Briefing, United States Army Tank Automotive Command, April 6, 1992.
54. William Power, "Defense Stocks Would Thrive on a Clinton Win," The Wall Street Journal, October 27, 1992, p. C 2.
55. Steven Pearlstein, "Defense Contractors Await Cutback Plan," The Washington Post, November 9, 1992, p. 23 (business).
56. George P. Psihas remarks to the National Contract Management Association Symposium, November 10, 1992.
57. Eric Orsini, briefing on "Role of the Depots in Combat Vehicle Modernization," March 5, 1992.
58. Peter F. Drucker, Management Tasks, Responsibilities, Practices, Harper & Row Publishers, New York, 1974, p. 126.
59. "Alternatives for the Tank Industrial Base," Congressional Budget Office, Washington, D. C, February, 1992, p. 2.
60. Office of Technology Assessment (OTA), Congress of the United States, Redesigning Defense: Planning the Transition of the Future U S Defense Industrial Base, Washington, D. C, p. 8.